

Physical Activity, Behavioral Epidemiology, and Public Health

This issue of *Public Health Reports* contains papers prepared for the Workshop on Epidemiologic and Public Health Aspects of Physical Activity and Exercise, conducted by the Centers for Disease Control on September 24–25, 1984. Each paper by itself is a worthy contribution to the scientific literature. As a whole, they provide an excellent summary of the current state of our knowledge plus useful research recommendations.

The authors present evidence demonstrating that regular physical activity is clearly beneficial for cardiovascular health, weight control, and reduction of symptoms of depression, depressed mood, and anxiety (1–3). Evidence of other benefits is suggestive but not established (1,3,4). In some important areas of public health, however, we know surprisingly little. For instance, the incidence of injuries and other hazards related to common aerobic exercise activities is unknown (5). The reasons why people do or do not exercise are largely unknown (6), as are the components of a successful program in the worksite, school, or community (7). Although everyday occurrences and conversations suggest that leisure-time physical activity is more common today than 10 to 15 years ago, we have few data to support that belief and essentially none to tell us if the behavioral changes involve all segments of our society (8,9).

The details of these issues, and more, are well presented in the papers. Therefore, we turn our attention to two tangential but important topics that deserve attention: behavioral epidemiology and public policy. First, behavioral epidemiology, the fabric from which the papers are tailored, is mentioned only briefly (8). Second, the papers generally focus on how physical activity does or may influence the public's health and not on how public health does, may, or should influence physical activity. The papers were not intended to address public policy. However, sound policy emanates from factual assessments of the present status.

Behavioral epidemiology contains two distinguishable concepts. One is the epidemiologic relationship between behavior and disease; the other is the epidemiologic study of the behavior itself. Be-

havioral epidemiology is the identification of behaviors that are causally linked to disease—the study of the relationship between smoking and lung cancer, alcohol consumption and motor vehicle accidents, or sexual practices and herpetic infection. The relationships, once identified, should be clarified and refined to bolster the claim to causality and to point the way to prevention. The number of years of smoking, the frequency of driving after drinking, the number of sexual contacts are all important and useful refinements to the epidemiologic link between the behavior and the disease. This concept of behavioral epidemiology is an etymologic parallel with our current use of “environmental epidemiology,” which is the study of the relationship between disease and environmental conditions or contaminants. It is also in concert with traditional concepts of epidemiology such as the study of the distribution and determinants of disease.

The second concept in behavioral epidemiology is somewhat less traditional. It is the application of epidemiologic methods to study the distribution and determinants of behaviors that are causally linked with disease. One step removed from the relationship between behavior and disease, it is the epidemiologic study of the behavior itself. In terms of smoking, for example, the second component of behavioral epidemiology is the study of who smokes, why they smoke, and, for public health workers, how we can help people to stop smoking or not start. In terms of inactivity, it is the study of who is inactive, why they are inactive, and how we can help them be more active. This second concept of behavioral epidemiology is semantically similar to the way we use “cancer epidemiology” or “infectious disease epidemiology,” meaning the study of the distribution and determinants of cancer or of infectious disease. It differs from the traditional concept of epidemiology in that the focus is on the distribution and determinants of the behavior, not the disease produced. This second concept of behavioral epidemiology is vitally important because efforts in this field will help provide the knowledge we need to make progress in the second public health revolution cited in “Healthy People” (10). The control of contemporary scourges in our free society requires a better understanding of who has certain behaviors and, more importantly, why they have them. This will not be easy. Behaviors are extraordinarily complex and their determinants are

equally so. The answers will come slowly, but the stakes are high enough to justify the effort.

The papers on physical activity and exercise in this issue contain examples of both concepts of behavioral epidemiology. The papers on diseases, hazards, and mental health focus on the behavior-disease relationship and exemplify the first concept of behavioral epidemiology (1,3,5). The papers on the descriptive epidemiology and the determinants of exercise represent the second concept, where the focus is on the behavior (6,9). The paper on the relationship between activity and other health behaviors is a blend of the two concepts in which activity is studied as a possible determinant, not of disease but of other behavioral risk factors (2).

Other papers, such as the definitions and measurement papers, pertain to and are important to both concepts (11,12). Thus, the set of papers nicely demonstrates the spectrum of concern encompassed by behavioral epidemiology.

The second tangential but important topic pertains to public policy. Beyond identifying problems and setting forth worthy recommendations for research, these papers do not address public policy. Policy is a complex function of the severity of the problem, the certainty with which we know the cause of and solution to the problem, the cost of the solution, and methods of implementation. In this case, the problem is unnecessary and premature morbidity and mortality. The causes are multiple, but inactivity is one of them. Even though the authors of these papers tell us that we have much to learn about the relationship between physical activity and health, they also show us that, at the very least, physical activity both promotes cardiovascular health and weight control and reduces depression in many if not all segments of the population. The costs of physical activity are unquantified. We presume them to be so unusually obscure that we have not recognized them or that they are quantitatively small in comparison with the demonstrated benefits. The evidence also shows that nearly half of the population seems to be sedentary and that comparatively few persons are physically active by almost any operational definition of the phrase.

Given this scenario—that physical activity reduces morbidity and mortality, that much of our population is not physically active, and that the cost of being active appears to be small—it seems that a prudent policy would be to recommend, encourage,

and facilitate the adoption of a more physically active lifestyle by the majority of the population. The Public Health Service has established such a policy in “Objectives for the Nation” (13).

Unfortunately, the actions most likely to effectively and efficiently promote the adoption of an active lifestyle are not known (6). Nevertheless, certain actions seem appropriate. The information, skills, and facilities to become and remain active need to be made more available, especially to the youth in our society. Admittedly, the lack of information, skills, and facilities has not yet proven to be causally related to inactivity. Common sense assures us, however, that people will not do something if they do not know about it, if they do not know how to do it, or if they have no place in which to do it. Basic information, rudimentary skills, and accessible facilities are important, if not essential, to the initiation and adoption of a more active style of life. The public needs to be educated about the characteristics of exercise most likely to be beneficial—walking, jogging, swimming, cycling, or any activity requiring rhythmical contractions of large muscle groups for 20 to 30 minutes at least every other day (4).

Childhood and youth experiences appear to be important determinants of adult physical activity practices (6). We should help and encourage schools, especially elementary schools, to provide a daily exercise break with safe and appropriate facilities, equipment, and instructors. Emphasis should be on the development of skills for and an appreciation of activities easily carried on in adulthood. Facilities that are convenient, safe, and inexpensive are needed in inner-city, low-income areas and areas with a high concentration of older adults. Biking and jogging paths suitable for recreation and commuting seem like especially practical ideas. At the worksite, an exercise break can be offered as an alternative to the smoking and coffee break.

A clear message that physical activity is beneficial to the body and mind needs to be carefully delivered to all segments of the population. Priority should be given to those who are currently least active—elderly and lower-socioeconomic groups—and to those who are most likely to benefit and move our society into a healthier era—children. Our goal should be an ambience where reasonable levels of physical activity are the social norm.

A final cautionary note: activities should be started slowly, increased gradually, and not over-

done. A precipitous plunge into vigorous physical activity invites injury and disillusionment. On the other hand, a modest increase in physical activity performed by sedentary individuals will improve the overall health of our society more than increases in physical activity by those who are already active (4). The goal is to get everyone to be active. Marathons are not for everyone, but walking around the block probably is.

James O. Mason, MD, DrPH
 Director
 Centers for Disease Control
 Atlanta, GA

Kenneth E. Powell, MD, MPH
 Chief, Behavioral Epidemiology and
 Evaluation Branch
 Division of Health Education
 Center for Health Promotion and Education
 Centers for Disease Control
 Atlanta, GA

References

1. Siscovick, D. S., LaPorte, R. E., and Newman, J. M.: The disease-specific benefits and risks of physical activity and exercise. *Public Health Rep* 100: 180-188, March-April 1985.
2. Blair, S. N., Jacobs, D. R., and Powell, K. E.: Relationships between exercise or physical activity and other health behaviors. *Public Health Rep* 100: 172-180, March-April 1985.
3. Taylor, C. B., Sallis, J. F., and Needle, R.: The relation of physical activity and exercise to mental health. *Public Health Rep* 100: 195-202, March-April 1985.
4. Haskell, W. L., Montoye, H. J., and Orenstein, D. R.: Physical activity and exercise to achieve health-related physical fitness components. *Public Health Rep* 100: 202-212, March-April 1985.
5. Koplan, J. P., Siscovick, D. S., and Goldbaum, G. M.: The risks of exercise: a public health view of injuries and hazards. *Public Health Rep* 100: 189-195, March-April 1985.
6. Dishman, R. K., Sallis, J. F., and Orenstein, D. R.: The determinants of physical activity and exercise. *Public Health Rep* 100: 158-171, March-April 1985.
7. Iverson, D. C., Fielding, J. E., Crow, R. S., and Christenson, G. M.: The promotion of physical activity in the U.S. population: the status of programs in medical, worksite, community, and school settings. *Public Health Rep* 100: 212-224, March-April 1985.
8. Powell, K. E., and Paffenbarger, R. S.: Workshop on epidemiologic and public health aspects of physical activity and exercise: a summary. *Public Health Rep* 100: 118-126, March-April 1985.
9. Stephens, T., Jacobs, D. R., and White, C. C.: The descriptive epidemiology of leisure-time physical activity. *Public Health Rep* 100: 147-158, March-April 1985.
10. Department of Health, Education, and Welfare: Healthy people: the Surgeon General's report on health promotion and disease prevention. DHEW (PHS) publication No. 79-55071. U.S. Government Printing Office, Washington, DC, 1979.
11. Caspersen, C. J., Powell, K. E., and Christenson, G. M.: Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. *Public Health Rep* 100: 126-131, March-April 1985.
12. LaPorte, R. E., Montoye, H. J., and Caspersen, C. J.: Assessment of physical activity in epidemiologic research: problems and prospects. *Public Health Rep* 100: 131-146, March-April 1985.
13. Department of Health and Human Services: Promoting health/preventing disease: objectives for the nation. U.S. Government Printing Office, Washington, DC, fall 1980.

Physical Activity Research and Coronary Heart Disease

An ounce of prevention is worth a pound of cure.

In the last few years this old adage seems to have gained renewed life and interest, especially in medicine and with regard to chronic diseases. However, the *informed* application of this maxim has not proven to be easy. Primary prevention of coronary heart disease (CHD), chiefly through nonpharmacological approaches, is an excellent example. Within this area of scientific interest the role of physical activity has been examined in a variety of settings and can serve as a model of more general problems.

Numerous carefully executed, prospective, observational studies have generally, if not consis-

tently, identified several individual characteristics that relate to the subsequent development of CHD. These include the well-publicized and treatable risk factors of blood cholesterol, blood pressure, and cigarette smoking. However, subsequent research efforts to establish whether such risk factors are causative in the development of CHD or are simply correlated with CHD, possibly through some other factor, have been difficult undertakings. The knowledge base regarding the association between physical activity and CHD is not as well developed as for blood cholesterol, blood pressure, and cigarette smoking for several reasons, not the least of which is that exercise does not appear to be as important an independent risk factor as the others. Nonetheless, it deserves careful evaluation. Major aspects of the currently available information are discussed in considerable detail in this issue of *Pub-*